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ABSTRACT

This document explains the Arkansas science benchmarks for grades K-4 which were developed to provide guidance to science teachers. The content standards for three strands--physical science systems, life science systems, and Earth science/space science systems--were identified based on grade levels. (YDS)

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Science Grades K - 4 Benchmarks

Science should be taught everyday and integrated with other subjects wherever possible. Learning and using science depends on reading and mathematics skills. Science should be an activity - and - discover study. The best time to reinforce the inquisitiveness of science is in the early grades.

In the following benchmarks, there are blank areas within the early grades. This means that the teacher may choose to create and teach a science lesson or not teach a science lesson for that particular learner expectation.

Teachers are encouraged to teach all the learner expectations in the early grades. Often students in the early grades are ready for higher level lessons than students in the past were.

Neither the science framework nor these benchmarks will follow the sequence of any textbook. Schools should adjust their curriculum to meet the needs of their students. Neither the framework nor these benchmarks will cover all the possible science topics. Schools are encouraged to add topics to meet the needs of students. A district curriculum that covers in its local science curriculum all the student learning expectations by the end of the fourth grade will have students who are well prepared.

These benchmarks are guides and not absolutes. Teachers in each district should set the scope and sequence for science learning in grades K-12.

When a benchmark exam is developed for the 4th grade in science, schools will be informed well in advanced as to what to expect and how to prepare their students.

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STRAND 1: PHYSICAL SYSTEMS
CONTENT STANDARD 1
Students will demonstrate an understanding of physical systems as a process of inquiry.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.1.1. Examine the techniques of *scientific inquiry*, problem solving, questioning, reasoning, and creative decision making by utilizing the *scientific method*.	Students will name the observable properties and characteristics of objects. Students will describe an observation orally or pictorially. Students will work in small groups to collect information. Students will make predictions and test them.	Students can group objects according to the objects' properties. Students can use simple graphs, pictures, or writings to observe, describe, or compare data. Students can work with others in a group to solve a science problem. Students will make predictions and test them.	Students will examine how objects can be grouped according to similarities and differences. Students will participate in simple experiments and observe the experiment. Students know that sharing information and discussing results is an important part of the scientific method. Students will make predictions and test them.	Students use inquiry methods to form written hypotheses. Students will participate in simple experiments and observe the experiment. Students understand the importance of accuracy and repetition in conducting experiments. Students will make predictions and test them.	Working in groups or individually, students use scientific inquiry to solve teacher-made problems. Students will use the scientific terms hypothesis and theory correctly. Students set up simple experiments. Students know that scientific investigations generally work the same in different locations. Students will make predictions and test them.

STRAND 1: PHYSICAL SYSTEMS
CONTENT STANDARD 1
Students will demonstrate an understanding of physical systems as a process of inquiry.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.1.2. Use simple equipment (microscopes), age-appropriate tools (rulers, thermometers), skills (describing and writing), technology (computers) and mathematics in scientific investigations.	Students can recognize that objects are different sizes. Students count at a beginning level.	Students can use science tools to examine and measure objects (hand lenses, rulers, etc.). Students count objects and write about objects they study.	Students are aware of safety rules and can identify these rules on exams. Students can use science tools to examine and measure objects (hand lenses, rulers, microscopes, etc.). Student will use mathematics and writing to examine and describe the objects studied. Students can measure length in English and metric systems.	Students are aware of safety rules and can identify these rules on exams. Students will use scientific tools and computers, appropriate for their age, to study or learn about the natural world. Students will use mathematics (calculators) and writing to examine and describe the world. Students can measure length and weight in English and metric systems.	Students are aware of safety rules and can identify these rules on exams. Students will use scientific tools and computers appropriate for their age. Students will use mathematics (calculators) and writing to examine and describe the natural world. Students can measure length, weight, and volume in English and metric systems.
PS 1.3. Communicate designs, procedures, and results of scientific investigations (graphs, charts, and writings).	Students can draw or paint pictures about nature scenes. Students can make graphs with objects used in the classroom.	Students use mathematics in grouping objects. Students can distinguish between groups of objects that represent MORE from groups that represent LESS.	Students will make scientific observations and communicate their findings.	Students can make simple graphs and charts of their results from their observations.	Students can make graphs and charts and describe the meaning of their charts and graphs in writing. Students can use charts and graphs to explain ideas and make interpretations and predictions in an experiment they create.

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STRAND 1: PHYSICAL SYSTEMS
CONTENT STANDARD 2
Students will explore, demonstrate, communicate, apply, and evaluate the knowledge of physical systems.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.2.1. Recognize the differences and similarities of *solids*, *liquids* and *gases*.	Students can recognize water, milk, and orange juice as a liquid.	Students can recognize a solid and a liquid.	Students can recognize air as a gas and describe its properties.	Students can name the observable properties of solids, liquids, and gases. Students can recognize the effects of heating and cooling on solids, liquids, and gases.	Students understand that heating or cooling of matter will speed up or slow down the motion of small particles within matter and that this is what causes a change in state from solid to liquid to gas or the reverse.
PS.2.2. Understand the physical properties of objects.	Students recognize ice and water.	Students understand the physical properties of ice and water.	Students can accurately describe the physical properties of common objects selected by the teacher.	Students can describe how the heating and cooling of matter will speed up or slow down the motion of the small particles within matter.	Students can explain how heating and cooling affect the state of matter.
PS.2.3. Learn about the physical world by observing, collecting data, using age-appropriate tools, describing, and hypothesizing.	Students know that learning comes from careful observation.	Students, alone or in groups, can make observations and write or illustrate what they have observed.	Students are aware of safety rules and can identify these rules on exams. Students can distinguish between an observation and a hypothesis. Students know from experience that common objects are composed of parts too small to be seen without magnification. Students can measure temperature using a thermometer.	Students are aware of safety rules and can identify these rules on exams. Students can make accurate observations using microscopes and hand lenses. Students know that everything is composed of small particles that cannot be seen using scientific tools available in an elementary classroom.	Students are aware of lab safety rules and can identify these rules on exams. Students make written hypotheses about how the physical world works based on observations.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.2.4. Revise *hypothesis* by sharing and communicating observations through writing.			Students can make predictions about events in the near future based upon present evidence.	Students distinguish between a guess and a hypothesis.	Students share their hypotheses and then revise them after acquiring additional information.
PS.2.5. Explore energy changes.	Students know the effects of sun and shade on the same object.	Students know that heat is produced when something is burned, rubbed to produce friction, heated by the sun, or by some other heat source. Students use a thermometer to measure the amount of heat absorbed by an object.	Students can identify different forms of energy (heat, light, sound, etc.). Students can explain that the Sun provides the Earth with energy in the form of heat and light. Students know that plants can store the energy of sunlight. This chemically stored energy in the plant can be released by heating the dried plant causing it to release light and heat.	Students observe energy changes in teacher-led experiments where light is used to heat an object or where heating an object can cause it to glow.	Students know a variety of sources of electricity (hydroelectric, nuclear, coal, solar, geothermal, windmills, etc.). Students will give examples of potential and kinetic energy.
PS.2.6. Identify *chemical* and *physical changes*.					Students can identify a chemical and a physical change.
PS.2.7. Classify simple machines and relate them to inventions and discoveries.			Students can use a simple lever to move an object. Students can name common tools that act as a lever.	Students can identify examples of simple machines from drawings. Students can use wooden blocks to construct simple levers and wedges.	Students can identify simple machines in every day hand tools (hammers, screwdrivers, screws, scissors, etc.). Students understand how simple machines are used to make work easier.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.2.8. Explore the effects of applying various types of *forces* to an object (push/pull).		Students know that the motion of an object can be changed by a push or pull.	Students explore that various things move at different speeds when different forces are applied.	Students know that a force is any push or pull on an object. Students can describe the motion of objects (forward, backward, circular, wave, etc.).	Students know that velocity describes a change in distance over time.

STRAND 1: PHYSICAL SYSTEMS
CONTENT STANDARD 2
Students will explore, demonstrate, communicate, apply, and evaluate the knowledge of physical systems.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.2.9. Identify and compare the relationships between *mass/weight, force,* and *motion.*		Students examine the weight of different objects.	Students identify various ways gravity affects the motion of objects when dropped, rolling down hill, etc. Students know that different things move at different speeds.	Students know that the weight of an object is equal to the sum of its parts. Students know that an object may move in a straight line at a constant, faster, or slower speed, or change direction dependent on a force acting on the object. Students can identify, but may not understand, the concepts of mass/weight, force, and motion.	Students know that changes in speed or direction of motion are caused by forces. The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.

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Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.2.10. Examine properties, types, and uses of magnets.	Students learn through play that magnets stick to some objects. Students learn that magnets move by push and pull.	Students know that magnets attract each other and other objects.	Students know that the north and south poles of magnets are attracted to each other. Students know that like magnetic poles repel each another (end to end and S to S).	Students examine how different shaped magnets work and what is attracted to them.	Students observe how a magnet affects a directional compass and can write about their results. Students research and describe in writing how magnets are used in everyday machines.
PS.2.11. Analyze and compare the relationship between magnets and electricity.			Students know that matter is made of positive and negative particles. Students know that positive and negative particles are attracted to one another.	Students understand the relationship between magnetism and electricity.	Students can construct electromagnets and experiment with them. Students can explain the relationship between magnets and electricity.
PS.2.12. Experiment with *static* and *current electricity*.		Students experiment with static electricity.	Students know that static electricity is electrons jumping from one object to another and that current electricity is electrons moving in a conductor.	Students know that moving electrical charges in a closed circuit can run motors, light bulbs, produce heat, etc. Students can name several conductors and insulators of electricity.	Students know the difference between static electricity and current electricity. Students can identify a simple circuit.
PS.2.13. Determine the relationship between vibration and sound.		Students know that vibrations in objects can be felt.	Students know that objects produce sound when they are vibrated.	Students can produce musical instruments with rubber bands or strings of various lengths to determine the relationship between their length and the sounds produced.	Students can explain that differences in waves affect sound (high and low pitch, loud or soft sound).

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PS.2.14. Explore the properties of light (e.g., *reflection, refraction, absorption, translucent, transparent,* and opaque).		Students explore that light can pass through some objects and not others. Students can name appropriate colors.	Students can predict which objects will allow light to pass through them and which will not. Students predict which objects will reflect light and which will not. Students know that sunlight is made of all the colors.	Students will experiment with light passing through a prism. Students will experiment with different colored light sources projected onto different colored objects to test absorption of colors.	Students will experiment with concave and convex lenses to see how images look when the lenses are held in front of eyes at different distances.

STRAND 1: PHYSICAL SYSTEMS
CONTENT STANDARD 3
Students will demonstrate an understanding of the connections and applications of physical science.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.3.1. Understand that physical science is interwoven into the structure of all disciplines.		Students can illustrate how light and sound are used in their lives each day.	Students can write about how electricity and machines affect their lives each day.	Students can write about how history has changed because of inventions based on the physical sciences.	Students can illustrate and develop a written plan before construction.
PS.3.2. Recognize that mathematics is the basis of communication in physical science.		Students can read number symbols and number words. Students can count the members in a small group of objects.	Students can read more complex number symbols and number words. Students can count larger numbers of members in a group they are studying.	Students can add and subtract numbers in science experiments. Students give rough estimates of numerical answers to problems before calculating. Students can use both basic English and metric systems in answers to problems.	Students can calculate answers using a formula. Students can use both English and metric systems to solve problems.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
PS.3.3. Understand that tools allow tasks to be done more easily.			Students use simple tools in their classroom.	Students can name various kinds of instruments used in science (measuring sticks, timing devices, microscopes, balances, collecting nets, magnets, hot plates, etc.).	Students can name various kinds of instruments used in science (telescopes, graduated cylinders, beakers, force meters, volt meters, calipers, cameras, electron microscope, etc.).
PS.3.4. Explore physical science related careers.			Students can name professions in their community that use knowledge about electricity.	Students can name professions in their community that use knowledge about light and sound.	Students can name professions in their community that use knowledge about energy and mathematics.

STRAND 2: LIFE SCIENCE SYSTEMS

CONTENT STANDARD 1

Students will demonstrate an understanding of life science as a process of inquiry.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
LS.1.1. Utilize the *scientific method* to investigate life sciences.	Students will name the observable properties and characteristics of objects. Students will describe an observation orally or pictorially. Students will work in small groups to collect information. Students will make predictions and test them.	Students can group objects according to the objects' properties. Students can use simple graphs, pictures, or writings to observe, describe, or compare data. Students can work with others in a group to solve a science problem. Students will make predictions and test them.	Students will examine how objects can be grouped according to similarities and differences. Students will participate in and observe simple experiments. Students know that sharing information and discussing results are important parts of the scientific method. Students will make predictions and test them.	Students use inquiry methods to form written hypotheses about common objects placed in a sealed box. Students will participate in simple experiments and observe the experiment. Students understand the importance of accuracy and repetition in conducting experiments. Students will make predictions and test them.	Students use scientific inquiry to solve problems. Students will use the scientific terms <u>hypothesis</u> and <u>theory</u> correctly. Students can set up simple experiments. Students know that scientific investigations generally work the same in different locations. Students will make predictions and test them.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
LS.1.2. Select age-appropriate equipment and utilize technology and mathematics in the inquiry of life science.	Students can recognize that objects are different sizes. Students begin to learn to count.	Students can use science tools to examine and measure objects (hand lenses, rulers, etc.). Students count objects and write about objects they study.	Students are aware of lab safety rules and can identify these rules on exams. Students can use science tools to examine and measure objects (hand lenses, rulers, microscopes, etc.). Students will use mathematics and writing to examine and describe the objects studied. Students can measure length in English and metric systems.	Students are aware of lab safety rules and can identify these rules on exams. Students will use scientific tools and computers appropriate for their age to study or learn about the natural world. Student wills use mathematics (calculators) and writing to examine and describe the natural world. Students can measure length and weight in English and metric systems.	Students are aware of lab safety rules and can identify these rules on exams. Students will use scientific tools and computers, appropriate for their age, to study or learn about the natural world in well-equipped science labs. Students will use mathematics (calculators) and writing to examine and describe the natural world. Students can measure length, weight, and volume in English and metric systems.
LS.1.3. Generate graphs, writings, and charts to communicate life science investigations.	Students can draw or paint pictures about nature scenes. Students can make graphs with objects used in the classroom.	Students use mathematics in grouping objects. Students can distinguish between groups of objects that represent MORE from groups that represent LESS.	Students can write about or illustrate their observations in scientific studies.	Students can make simple graphs and charts of their results from their observations.	Students can make graphs and charts and describe in writing the meaning of their charts and graphs. Students can use charts and graphs to explain ideas and make interpretations and predictions.

STRAND 2: LIFE SCIENCE SYSTEMS
CONTENT STANDARD 2
Students will explore, demonstrate, communicate, apply and evaluate the knowledge of life systems.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
LS.2.1. Identify and compare characteristics of living and nonliving things.	Students can identify living objects.	Students can identify living and nonliving objects.	Students can classify age appropriate things as living or nonliving.	Students understand that living things can reproduce and nonliving things cannot reproduce.	Students understand that living things consume food, water, minerals, and use energy and that nonliving things do not.
LS.2.2. Explore cells in *organisms*.		Students know that there are things too small to be seen by the naked eye.	Students know that living things are composed of cells that in most cases are too small to be seen.	Students know that processes needed for life are carried out by cells.	Students can draw and write about cells viewed under a microscope. Students can identify the cell wall and nucleus when viewing cells in drawings or under a microscope.
LS.2.3. Identify and investigate the functions of body systems in *organisms*.	Students can name exterior body parts on people and animals.	Students can name interior body organs in people and animals. Students can name the exterior parts of plants.	Students understand that plants and animals are different, but they share common characteristics. (They have structures for reproduction, respiration, and growth).	Students can describe the functions of four body systems (nervous, respiratory, digestive, and circulatory) in animals. Students can name the functions of leaves, stems, and roots in plants.	Students know the name and function of each system in the human body.
LS.2.4. Recognize patterns and characteristics of *organisms*.		Students know selected characteristics of plants and animals (shape, size, color, etc.).	Students can tell the difference between common plants and animals.	Students recognize that living things need food, water, space, and shelter. Students can tell the difference between plants and animals.	Students know that animals and plants have various life patterns.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
LS.2.5. Explore the life cycles of *organisms*.		Students can name ways living things change and grow over time (seed to flowering plant, tadpole to frog).	Students can name the ways living things change as they grow and mature.	Students can describe the life stages of animals from birth, young learning from adults, becoming independent, reproducing and dying. Students can describe the life stages in some plants from seed growth, developing leaves, making food, developing seeds, and dying.	Students know and observe that plants and animals have life cycles.
LS.2.6. Name some common animals that no longer exist (e.g., dinosaurs and mammoths).	Students can name common household pets.	Students can name common wildlife animals and what these animals need to survive.	Students can name animals that lived in the past (dinosaurs, saber-toothed tiger, woolly mammoths).	Students understand that some animal species have died out because changes in the climate caused depletion of food sources and loss of habitat.	Students understand the order in time that some animals have appeared on Earth.
LS.2.7. Understand that offspring are similar to their parents.	Students can identify from pictures similar parents and offspring.	Students understand that they are similar but not identical to their biological parents.	Students can identify that plants and animals produce similar types of offspring (flowers produce flowers, dogs produce dogs).	Students can recognize how they are similar to their biological parents and siblings.	Students understand that traits from both parents are passed to their offspring.
LS.2.8. Identify the features of plants and animals that enable them to live in different environments.	Students can name common plants and animals.	Students can name features unique to birds, fish, bears, frogs, cows, pine trees, cacti, roses, and water lilies.	Students can name ways animals and plants are adapted to living in different environments.	Students can name special features (e.g., gills, wings, fur, size, leaf shape, thorns, etc.) that enable organisms to live in different environments.	Students can name special behaviors (e.g., hibernation, migration, etc.) that enable organisms to live in different environments.
LS.2.9. Define and describe a *food chain* and a *food web*.	Students can name foods that animals and humans eat.	Students can name common food chains.	Students can name common food webs.	Students can describe in writing the roles of producers, consumers, and decomposers in food chains and webs.	Students can explain each item in a food web or food chain.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
LS.2.10. Understand that *organisms* are interdependent.		Students know that plants produce oxygen and food for animals.	Students know that organisms need air, nutrients, minerals, water, and shelter.	Students can name nonliving parts of the environment that organisms are dependent upon.	Students know that plants and animals interact with each other and with the nonliving environment in an ecosystem (e.g., organization of communities and flow of energy through the food web).

STRAND 2: LIFE SCIENCE SYSTEMS
CONTENT STANDARD 3
Students will demonstrate an understanding of the connections and applications in life sciences.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
LS.3.1. Understand that life sciences are interwoven into all disciplines.		Students can draw and paint how plants and animals interact each day.	Students can write about how other living things affect their lives each day.	Students can write about how history has changed because of inventions from the life sciences.	Students know that past events affect the present and that present events affect the future.
LS.3.2. Recognize that mathematics is the basis of communication in life science.		Students can read number symbols and number words. Students can count the members in a small group of objects.	Students can read more complex number symbols and number words. Students can count greater numbers of members in a group they are studying.	Students can add and subtract numbers in science experiments. Students give estimates of numerical answers to problems before calculating. Students can use both basic English and metric systems in answers to problems.	Students can use both English and metric systems to solve problems.

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Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
LS.3.3. Identify that humans change environments in ways that can be beneficial or detrimental for themselves and other organisms.		Students can name some forms of pollution produced by man. Students can identify ways people can conserve resources.	Students can write about ways to save the rain forests of the world. Students can develop plans for their homes that can save resources.	Students can measure the amount of solid waste produced at their homes over a week's time. Students can research and write about where their drinking water comes from and where it goes after use.	Students know that human actions can have an impact on the environment.
LS.3.4. Explore careers related to life sciences.		Students can identify medical professions as careers in the life sciences.	Students can identify careers in the life sciences.	Students can identify careers in the life sciences.	Students can research careers in the life sciences.

STRAND 3: EARTH/SPACE SYSTEMS

CONTENT STANDARD 1

Students will demonstrate an understanding of the inquiry process through the study of earth and space systems.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
ES.1.1. Utilize the *scientific method* to investigate earth/space systems.	Students will name the observable properties and characteristics of objects. Students will describe an observation orally or pictorially. Students will work in small groups to collect information. Students will make predictions and test them.	Students can group objects according to the objects' properties. Students can use simple graphs, pictures, or writings to observe, describe, or compare data. Students can work with others in a group to solve a science problem. Students will make predictions and test them.	Students will examine how objects can be grouped according to similarities and differences. Students will participate in simple observations. Students know that sharing information and discussing results are important parts of the scientific method. Students will make predictions and test them.	Students will participate in simple experiments and observe experiments. Students understand the importance of accuracy and repetition in conducting experiments. Students will make predictions and test them.	Students use scientific inquiry to solve problems. Students will use the scientific terms hypothesis and theory correctly. Students set up observations. Students know that scientific investigations generally work the same in different locations. Students will make predictions and test them.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
ES.1.2. Select appropriate equipment and utilize technology and mathematics in the inquiry of earth/space systems.	Students can recognize that objects are different sizes. Students begin to learn to count.	Students can use science tools to examine and measure objects (hand lenses, rulers, etc.). Students count objects and write about objects they study.	Students are aware of safety rules and can identify these rules on exams. Students can use science tools to examine and measure objects (hand lenses, rulers, microscopes, etc.). Students will use mathematics and writing to examine and describe the objects studied. Students can measure length in English and metric systems.	Students are aware of safety rules and can identify these rules on exams. Students will use scientific tools and computers, appropriate for their age, to study or learn about the natural world. Students will use mathematics (calculators) and writing to examine and describe the natural world. Students can measure length and weight in English and metric systems.	Students are aware of safety rules and can identify these rules on exams. Students will use scientific tools and computers, appropriate for their age, to study or learn about the natural world in well-equipped science labs. Students will use mathematics (calculators) and writing to examine and describe the natural world. Students can measure length, weight, and volume in English and metric systems.
ES.1.3. Generate graphs, writings, and charts to communicate earth/space systems investigations.	Students can draw or paint pictures about nature scenes. Students can make graphs with objects used in the classroom.	Students use mathematics in grouping objects. Students can distinguish between groups of objects that represent MORE from groups that represent LESS.	Students will make scientific observations and communicate their findings.	Students can make simple graphs and charts of results from their observations.	Students can make graphs and charts and describe the meaning of their charts and graphs. Students can use charts and graphs to explain ideas and make interpretations and predictions.

STRAND 3: EARTH/SPACE SYSTEMS

CONTENT STANDARD 2

Students will explore, demonstrate, communicate, apply and evaluate knowledge of the properties of earth and space systems.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
ES.2.1. Recognize and classify different types of earth materials.	Students know that the Earth's surface is composed of different types of materials of various sizes.	Students can identify and differentiate soil from rock. Students can recognize rocks and sort them into groups based on physical properties.	Students can recognize sand, silt, and clay in soils.	Students can distinguish sandstone from limestone rocks in Arkansas.	Students can identify different kinds of rocks (e.g., igneous, metamorphic, and sedimentary rocks and common fossils). Students understand the stages of the rock cycle.
ES.2.2. Describe major features of the earth's surface and how it is affected by natural changes.	Students can name stormy conditions such as rain, sleet, and snow. Students know that the surface of the earth can vary from high to low.	Students can identify soil erosion on school grounds.	Students can identify how water and ice break up the soil on the school ground and in their community.	Students can demonstrate erosion of a soft dirt surface by wind or water.	Students can explain the processes by which mountains are formed.
ES.2.3. Identify the natural divisions of Arkansas.	Students can identify the outline map of Arkansas.	Students can identify mountains, valleys, lakes, streams, and rivers in Arkansas.	Students can name common trees, wildlife, and plants of Arkansas.	Students can name the geologic features of each of the six natural divisions in Arkansas.	Students can name the characteristics (geology, plants, animals, land uses) of each of the six natural divisions of Arkansas.
ES.2.4. Understand that the Earth is layered (*crust, mantle, and core*).	Students can identify soil as small rocks, decayed matter, and water.	Students understand that as we travel deeper into the Earth it becomes hotter.	Students know that the Earth has an outer crust and a warmer middle.	Students understand that the Earth's crust is brittle and floats on top of a more motile mantle.	Students understand that the Earth is composed of three distinct layers that are motile.
ES.2.5. Investigate seasonal changes in weather and factors that affect weather conditions.	Students know that the sun changes position during the day. Students understand that bright, sunny days mean good weather and that dark, cloudy skies can mean rain.	Students know that weather conditions occur in patterns over time. (Some days it rains and some days it is sunny. It is cooler in the winter and warmer in the summer.)	Students can investigate and record weather changes from day to day and throughout the year. They can also compare their results with their local media weather report.	Students can discern seasonal changes in the weather.	Students can make predictions about weather. Students can locate N, NE, E, SE, S, SW, W, and NW.

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Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
ES.2.6. Describe the *water cycle.*	Students can identify precipitation, clouds and puddles.	Students watch teacher demonstrations of water changing from liquid to steam and from liquid to solid and can predict what water will do when cooled or heated enough to cause a change.	Students have watched teacher demonstration of steam condensing on a cooler glass surface and can successfully name this process as condensation.	Students can name the stages in the water cycle (evaporation, condensation, and precipitation). Students can explain the water cycle.	Students can describe how the water cycle is influenced by temperature and landforms.
ES.2.7. Discuss land forms in the ocean and how they change.	Students can identify the ocean on a map.	Students understand that 75% of the surface of the Earth is covered by water.	Students can identify islands and continents on maps.	Students can identify ocean floor landforms such as spreading zones, trenches, volcanoes, etc.	Students can identify the landforms in the ocean and describe how they change.
ES.2.8. Analyze the features and motions of the sun, moon, earth and other celestial bodies (e.g., *solar system*, moon phases, *earth's rotation* and *revolution*).		Students can recognize the sun, moon, and stars.	Students know that day and night are caused by the rotation of the Earth. Students know that our year is based on the number of days for Earth to revolve around the sun.	Students know that each time the Earth completes one rotation, one day has passed, and this takes 24 hours. Students know that the moon rotates around the Earth every 28 days. Students know that stars and planets are always in the sky. Students can name the planets around our sun.	Students know the phases of the moon are caused by its angle to the sun and earth. Students know the characteristics of Mercury, Venus, Earth, and Mars. Students know the relative positions of the planets in the night sky. Students know the Earth revolves around the Sun every 365 days. Students know that the tilt of the earth affects the seasons.

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STRAND 3: EARTH/SPACE SYSTEMS
CONTENT STANDARD 3
Students will demonstrate an understanding of the connections and applications of earth and space systems.

Learning Expectations	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four
ES.3.1. Understand and appreciate the uses of water.	Students can name the importance of water to people, animals, and plants.	Students can describe why plants and animals need water.	Students can describe how water can become polluted.	Students know about our water source, use, and/or treatment.	Students understand the sources and availability of water and recognize the significance of water in maintaining life forms.
ES.3.2. Describe uses and conservation of materials taken from the earth.		Students can identify ways that people can conserve resources.	Students can write about ways to save the mineral resources of the world.	Students know about collecting and using natural resources found in the earth.	Students can write about a variety of sources of energy (hydroelectric, nuclear, coal, solar, geothermal, windmills, etc.) and which sources conserve other resources.
ES.3.3. Identify the effect humans have on the environment (e.g., use and misuse).		Students can name some forms of pollution produced by man. Students can identify ways that people can conserve resources.	Students can write about ways to save the natural resources of the world. Students can develop plans for their homes that can save resources.	Students can measure the amount of solid waste produced at their homes over a week's time.	Students recognize that humans affect the environment. Students can develop written plans to save resources in their country.
ES.3.4. Understand how earth/space systems connect to other disciplines.		Students can illustrate how weather affects their lives each day.	Students use art materials to draw and paint the past and present environment in their community.	Student can write about how space exploration affects their daily lives.	Students recognize that the sciences and the arts interact.
ES.3.5. Recognize the importance of mathematics as the basis of communication in earth/space systems.		Students can read number symbols and number words. Students can count the members in a small group of objects.	Students can read more complex number symbols and number words. Students can count larger numbers of members in a group they are studying.	Students can add and subtract numbers in science experiments. Students can estimate answers to numerical problems before calculating.	Students can apply mathematics to solve science problems.

ES.3.6. Use age-appropriate equipment, tools, techniques, technology, and mathematics in *scientific investigation* of earth/space systems.	Students can recognize that objects are different sizes. Students begin to learn to count.	Students can use science tools to examine and measure objects (hand lenses, rulers, etc.). Students count objects and write about objects they study.	Students are aware of safety rules and can identify these rules on exams. Students can use science tools to examine and measure objects (hand lenses, rulers, microscopes, etc.). Students will use mathematics and writing to examine and describe the objects studied. Students can measure length in English and metric systems.	Students are aware of safety rules and can identify these rules on exams. Students will use scientific tools and computers, appropriate for their age, to study or learn about the natural world. Students will use mathematics (calculators) and writing to examine and describe the natural world. Students can measure length and weight in English and metric systems.	Students are aware of safety rules and can identify these rules on exams. Students will use scientific tools and computers, appropriate for their age, to study or learn about the natural world in well-equipped science labs. Students will use mathematics (calculators) and writing to examine and describe the natural world. Students can measure length, weight, and volume in English and metric systems.
ES.3.7. Explore careers related to earth/space science.			Students can name professions in their community that use knowledge about soils and rocks.	Students know about professions that use knowledge about weather and climate.	Students can identify and gather information about careers in earth and space science.

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